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Consolidation in times of overcapacity; strategic alliances vs. mergers and acquisitions in the liner shipping industry

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1. Abstract

As the world has witnessed in the recent past, the economic environment surrounding global trade has become increasingly dynamic and uncertain, with sudden and unexpected crises, trade imbalances and downturns of various nature. A sizeable number of companies have been forced out of business across different industries due to their lack of ability to continuously adapt to a rapidly changing environment; perhaps one of the most interesting industries to analyse in this context of uncertainty is that of the Liner Shipping, which has particularly suffered in the past 5 years. Indeed, the market for freight transportation of goods has been hit by a chronic issue of overcapacity, which carriers have failed to keep under control for different reasons that will be analysed later in this work.

Many liners have entered into strategic alliances to try and reduce the losses triggered by increasing competition in the market, as well as by a growing number of available vessels that caused freight prices to drop significantly; others have recurred to mergers and acquisitions of competitors, in an effort to reduce the overall capacity of the market although, as we will see, the desired effects have been slow to appear.

In this paper, I will conduct an in-depth analysis of the economic factors responsible for this excess capacity that has been so harmful to the shipping industry, but I will also develop an understanding of the effects that both strategic alliances and M&As have produced on the competitive environment; this will serve as a basis to outline possible future trends and develop some insights for the industry decision-makers.

Starting with a literature review to present the main research question and hypotheses, I will mostly base my research on a quantitative methodology, using secondary data on freight rates variations over time and other economic indicators, and analysing them in order to verify the research question.

2. Introduction

Industry consolidation has become a global trend, crossing borders and cultural barriers and driving the world towards an increasingly globalized trade. This phenomenon can be observed across different industries and at different scales, ranging from megamergers in the automotive and banking industries to networks of alliances in the telecom and aerospace sectors.

Firms typically engage in these operations for a variety of reasons, one of the most common being the desire to reduce the level of competition in the market and increase their degree of market power.

In the discussion concerning the most appropriate path to industry consolidation, authors such as Blonigen & Pierce (2016) have studied the effectiveness of horizontal Mergers and Acquisitions in absorbing excess capacity, whereby the removal of direct competitors from the market should, at least in theory, result in higher revenues and profitability for the industry.

Other authors, such as Killing (1998), Midoro & Pitto (2000) and Boile, Theofanis, Lei & Fan (2008), instead, have focused on strategic alliances, joint ventures and other forms of collaborative behaviours to understand how they drive a more effective use of resources and costs optimization.

Both alliances and M&As have a long tradition in the the maritime industry, and on the Liner Shipping business in particular, due to its highly cyclical nature. At the present time, it represents a great example of a distressed market, affected by a chronic overcapacity and in need of measures of consolidation as a buffer for declining revenues for its operators. For these reasons, I believe that it is an interesting market to analyse, particularly under the lens of consolidation.

This thesis, therefore, aims to address the following research question; what is the impact of strategic alliances and M&As on the profitability of the liner shipping industry?

One of the main points of this thesis is to show that the industry has entered into a vicious circle, whereby most operators pursue growth strategies that damage the market as a whole, resulting in a destructive competition that has affected profitability in the long term.

3. Literature Review

3.1. Strategic Alliances

In an economic environment that changes so rapidly like the one that surrounds us, sustainable competitive advantages are very hard to achieve by individual firms, regardless of the market in which they operate in. Industries evolve quickly for both internal and external factors, and strategic alliances can play an important role in ensuring that firms reap the benefits of such changes in an economically efficient way. In a study of alliances within the U.S. economy, Harrigan (2009) explains that such agreements have helped member companies to tap into the smallest portions of the market, which would have otherwise remained cut out from the rest, in those industries where alliances were adopted. These results have been achieved as a result of the adoption and development of more efficient productive processes, which often spilled over adjacent industries by means of vertical alliances (Geringer, 1991; Parkhe, 1993). Therefore, one of the main benefits of alliances where markets are saturated is that of providing an outlet to diversify the business away from the most crowded marketplaces.

Strategic alliances have a long tradition in the liner shipping industry that started around 1870, when ocean carriers first joined forces in an effort to eliminate some competition from the market through capacity removal and price-fixing agreements. The architecture of the global alliances we see today was built in 1996, although some members moved from one to the other during the years; besides the integration of transport operations, the current agreements mainly regard fleet and service sharing on the routes operated by the alliance (Lu, Cheng & Lee, 2006).

As Panayides (2011) points out, although the alliance networks are considered as global, they mainly focus on East-West services.

3.2.1. Types and Objectives of Alliances

There are several different types of alliances that firms can enter into, according to the peculiarities of the market, resources, competitors, etc. Broadly speaking, alliances can be equity or non-equity based, depending on the way the collaboration is governed; in the former case, one company acquires a minority stake of the other, while in the latter case equity is not transferred. Within these two categories of collaboration agreements, a further distinction can be made according to the purpose of the alliance; the most common ones, used by firms operating in the same industry, are defined as horizontal alliances, while collaborations along the supply chain (e.g. with suppliers or distributors) are called vertical alliances. In the same framework of the equity based alliances, a particular case is represented by joint ventures, where a new company is formed by two or more firms and is set up as a separate legal entity[1]; JVs can be formed for either a finite period of time or with longer term horizons (Hennart & Reddy, 1997).

As Porter (1985) introduced with the concept of value chain, alliances can be categorized according to the type of resources that each member pools into it, something that also depends on the corporate objectives that partners want to achieve; such objectives can be of various nature, although most commonly they are financial (e.g. investment risk sharing), strategic (e.g. geographical expansion) and operational (e.g. global coordination).

An example for this comes from the automotive industry, where BMW, Audi and Benz have a long history of collaboration on the technological development of parts for their new generation

[1] Despite acknowledging the differences in the governance of the two types of collaboration agreements, it is believed that the consolidation effect will be similar for alliances and JVs, so they will be both encompassed as "strategic alliances" in the theoretical development of this study. To be cautious, however, they will be split up in the empirical section, in order to exclude that they have a different effect on the industry.

vehicles, despite the rivalry in the market; however, the knowledge and risk sharing process has allowed these firms to achieve massive economies of scale in R&D, redirect the savings into other productive channels and increase their market power. Although the contribution of the alliance on overall market consolidation is not direct, it has helped the firms to expand their competitiveness to the hybrid car market.

Another argument in favor of participating into strategic alliances is offered by Shepherd (1970), who introduces the concept of market power to justify cooperative behaviors among firms striving to strengthen their position by eroding the business of other players (offensive alliances) or to create barriers to entry (defensive alliances). Either way, authors such as Williamson (1981) have claimed how "the advantages of alliances are not only enjoyed by their members, but also by the industry in general by means of lower transaction costs in acquiring information".

3.2.2. Consolidation Outcomes of Alliances

In addition to the factors highlighted above, alliances are generally not considered to be very demanding in terms of resources, with lower setup and integration costs; moreover, since they do not modify the financial structure of the organizations, the legal requirements they face are not very strict in most industries (although we will see how the shipping industry represents an exception). For these reasons, alliances have been widely adopted across different industries.

In the airline industry, Brueckner (2001) has found evidence of a positive effect of strategic alliances on market profitability by means of reduced competition, provided that the gap between supply and demand was not very wide. This last condition has very interesting implications for the shipping industry, where this wedge is currently large; the consequences in terms of alliances' effectiveness in the shipping industry are discussed in more details in the next sections.

The main driver of success in consolidating the airline industry has been the empowerment of carriers to unanimously raise their fares on certain routes, which impacted their profitability much more than the cost savings and the efficiencies in the shared use of resources. Clearly, multiple concerns of collusion and anti-competitive practices have arisen since the adoption of alliances, and the regulatory bodies still monitor the market closely to ensure fair competition. The similar nature of alliances in the airline and in the shipping industry "might lead to a marketplace dominated by a handful of large carriers that are not effectively competing with each other", as explained in a note of the U.S. General Accounting Office (1995); this is what is commonly referred to as "tacit collusion", which results in higher prices and higher profits for the dominating carriers.

This leads to the formulation of the **first hypothesis**;

> H_1 - Strategic alliances will have a positive impact on the shipping industry profitability, with higher alliance activity translating into higher freight rates for carriers.

However, such advantages are not always achieved in practice for different reasons. Indeed, multiple companies have experienced cases of instability and shifts in organizational objectives as a result of entering into strategic alliances (Midoro & Pitto, 2000), to a point where M&As are now preferred to consolidate this industry (Slack & Comtois, 1999), although more complicated and demanding in terms of resources. The sources for this instability have been identified in multiple factors, the most relevant being the preference for individual vs. alliance objectives, the existence of intra alliance competition (Midoro & Pitto, 2000) and the lack of mutual trust (Killing, 1988). This last issue was the primary cause of failure of the alliance between Hyundai and Daimler in the automotive industry in 2004; the initial objectives were to tap into the Asian market and extend the product line for Daimler, and to get access to advanced technological know-how.

The same authors also propose that, at least in theory, alliances have a higher chances of success when the agreements are carried out between a low number of members, with differentiated and clearly established roles and responsibilities, and when the "autonomous" functions such as marketing and sales are well coordinated.

3.2. Mergers and Acquisitions

M&As typically occur in cycles, or waves, (Jensen, 1988) and are driven by the opportunity to realize economies of scale, to enter new markets, to exploit synergies etc. Gorton (2000) defines mergers as defensive measures that companies adopt in their industry when they expect a negative shock, which "will make the merger profitable in some future state of the world" (Goriatchev, 2006), even if it is not initially; the idea is that, when an industry is unprofitable, mergers and acquisitions are used either to limit negative developments in the future, or to diversify away from the core business (Rumelt, 1974).

These kind of strategic considerations are important motivators of horizontal integration in fragmented industries, particularly in times of abnormal demand growth (Bernile, 2006). M&As, in this sense, help the acquirer to better control its future market positioning, according to its perception of future profitability; indeed, a higher market power allows the acquirer to withdraw capacity from the market if a drop in demand is realized, as well as fully exploiting its increased capacity if demand soars.

Taking into account these considerations, the **second hypothesis** is formulated;

> H_2 – Mergers and Acquisitions will have a positive impact on the shipping industry profitability, with higher consolidation activity translating into higher freight rates for carriers.

Also, when firms see a decrease in domestic demand, thus facing the need to extend their business to different markets or geographies, a merger could well be the most convenient

vehicle to diversify a firm's area of influence. Shocks in demand, both positive or negative, are more likely to trigger consolidation in industries with high fixed costs.

Christensen & Montgomery (1981) also suggest that "firms in unprofitable industries are more likely to set their target on unrelated industries", although they must have the required resources and capabilities for a successful integration in another industry.

Another interesting scenario for M&As can be explained by considering the recent deployment of "megaships" in the liner shipping industry, where the technological advancements of these vessels have raised the minimum threshold of operational efficiency at which firms need to operate if they want to survive (Piesse, 2013). However, such scale is simply not achievable by most companies individually due to internal and external constraints, something that has led to further consolidation through mergers and acquisitions of underperforming targets (Yeo, 2012). This has been defined as the "differential efficiency theory".

Finally, regulatory changes that go in the direction of removing restrictions to enter the market have been revealed to be a primary cause of mergers, by inducing incumbents to gain more market power and adopt deterrent behaviors aimed at creating barriers to potential entrants. As Fusillo (2009) noted, however, the chances of a monopolistic outcome from excessive deregulation are substantial.

There are other factors that are frequent drivers of mergers and acquisitions, and these are the dismissal of incompetent management (Fusillo, 2009), principal-agency issues (Piesse, 2013) and the avoidance of bankruptcy of a distressed company.

The topic of M&As in the liner industry has started to gain more attention by researchers around 1995, when the combined impact of regulation, competition, financial crises and the introduction of larger vessels pushed the industry to abandon alliances as the preferred form of

collaboration. This is consistent with the literature suggesting that external growth is preferable for companies operating in mature industries affected by overcapacity; in these cases, indeed, organic (or internal) growth would only exacerbate the problems of the market (Mitchell & Mulherin, 1996).

For these reasons, the **third hypothesis** is formulated as follows;

> H_3 - M&As are a more impactful measure of industry consolidation than Strategic Alliances and Joint Ventures, since they allow the acquirer to gain more market power while, at the same time, rationalize the capacity of the acquired companies and remove competition.

3.2.2. Consolidation Outcomes of M&As

Among the top 20 companies in the shipping industry, Maersk and CMA CGM have been the two most active in mergers and acquisitions, as it can be observed in the series of takeovers they carried out to wipe out some of their biggest direct competitors from the market; although one might say that they benefit from economies of learning in the selection of the right targets, due to the experience developed in acquiring companies in the past, it must be pointed out that the causal relationship between experience and success may not necessarily hold; it may be only a matter of larger size that allows more deals and better synergies. The two most relevant takeovers happened in 2004, when Maersk acquired P&O Nedlloyd, and in 2016, when CMA CGM took over Neptune Orient Lines (NOL).

Following the P&O takeover, Maersk managed to realize synergies and downsize its cost structure, exploiting economies of scale both in its operational arm and in port-related activities. This business model has allowed the company to be almost the only one consistently delivering positive bottom-line results to its shareholders, even in the low cycles of the industry ; the solidity of Maersk's business model is further reinforced by an impressive 36% Net Debt-to-Equity ratio, while the industry average is close to 110% (Alphaliner 40, 2016, see appendix

3.1). This suggests that the company has been able to finance its acquisitions and takeovers with its own operations, without needing to recur to excessive external debt.

In addition to the desire to realize economies of scale and cost savings, other factors have driven the acquisition strategies of liner companies, such as the need to expand the geographical coverage of their operations by taking over smaller players, often operating in niche markets; two successful examples in this direction are represented by the acquisitions of small Northern African companies by CMA CGM, and of East/West Africa operators by Maersk. These transactions, amongst a number of others, turned out to be particularly strategic for the optimization of the companies' large fleets, as well as to avoid the price wars occurring on the more crowded "traditional" trade routes.

In this sense, M&As have helped the largest players to diversify their operational portfolio and increase their overall business profitability.

4. The Liner Shipping Industry

The containerised shipping market is constituted by a number of single trades, defined as "the range of ports which are served at both ends of the service" (Benini, Gadas, Miersch, 2006). Each trade is operated by a number of different companies, sometimes organized in cooperative agreements as conferences, consortia and alliances, according to the specific characteristics of the route; on the same trade, the market conditions may vary a great deal on the two directions, because of trade imbalances for instance. The most widely used type of cooperation agreements are the horizontal "global alliances", whereby their members participate in a joint utilization of ships and port terminals on a global scale. Generally speaking, these kind of agreements do not include neither joint management, sales and marketing activities, nor asset-sharing or revenue-pooling practices (Slack et al., 2002), and carriers can be part of different alliances at the same time. However, individual members usually face penalties and restrictions with respect to withdrawal from the agreement for a period that is usually five years long. In this context, it is

important to point out that global alliances are not formed with price-fixing purposes, but rather for the integration and optimization of the resources and capabilities of each member, as well as to improve their destination coverage by means of a wider range of services that can be offered to their customers (Bergantino, 2002). Additionally, some companies have started to look for further cost savings and operation optimization by participating in the so-called "liner shipping networks", which also comprise different types of members such as Port operators and intermodal service providers to develop joint strategies.

The largest shipping groups like Maersk and MSC have pursued a growth strategy based on M&As (Alexandrou, 2014), trying to expand at a pace they could not achieve organically. The result has been that the top 3 carriers have gained a large degree of market power, creating concerns of monopolistic behaviours among regulators. However, as Haralambides (2004) points out, this industry cannot sustain perfect competition in the long term due to the high costs of capital that carriers face, meaning that there will always be an inclination towards monopolies under the current market conditions of oversupply.

The current shares of the top 20 carriers in the industry, accounting for about 80% of the total market, are shown in table 4.1.

The industry analysed in this paper is extremely capital intensive, with high fixed costs incurred in the deployment and maintenance of the container ships, regardless of the amount of goods actually transported. This structure poses an obstacle to consolidation, as it makes it unattractive for potential buyers to take over unprofitable companies, due to the high risks of losing the capital committed. Moreover, 14 out of the 20 top carriers are controlled by either state-owned entities or family-owned empires, which traditionally tend to be more resistant to takeovers (Alphaliner WK 21/14, "M&A prospects for the Industry"); an extreme example are the three largest Japanese liner companies (MOL, NYK Line and K-line), each linked to different

"keiretsu" groups, a big deterrent for potential buyers (Grabowiecki, 2006). As a further proof for this trend, it is interesting to look at the last "mega-merger" consolidation wave that occurred between 1997 and 2005, which involved six of the top 20 carriers, i.e. Nedlloyd, DSR, APL, Sea-Land, P&O and CP Ships. Five out of six of the companies acquired in these deals were publicly listed without controlling shareholders, which made the acquisitions easier to execute.

4.1. Regulatory Framework

Regulation has changed considerably in the last two decades, both in Europe and in the United States. In 2008, the European Commission abolished the exemption from competition rules for shipping liners, which had to put an end to the system of conferences they had used until then to regulate capacity on the market and, more or less indirectly, freight rates (Yeo, 2013); similarly, the United States congress approved the Ocean Shipping Reform Act (OSRA) in the same year, with deregulating effects on the U.S. market.

In addition to this, new independent bodies for competition law enforcement have been established in the rest of the world, often applying different standards and thus making the overall regulatory environment quite intricate.

4.2. The Phenomenon of Mega-Ships and Overcapacity

The largest vessels operating at the present time can carry up to 19200 TEUs at full capacity, something quite striking when compared to the capacity levels of only a decade ago; adding on to this, the order books of shipbuilding companies reveal that around 55 ships with a capacity of 18000-21000 TEUs each will be delivered by the end of 2019, on top of the deliveries of smaller vessels over the same period. The results on the overall industry capacity are expected to be quite negative, as the projections forecast an increase of about 4 million TEUs from the actual 19M to 23M on Dec. 31st, 2019, for an annual growth of 5% a year (Alphaliner 40, 2016).

Leaving aside any consideration regarding the externalities of this phenomenon in terms of environmental and infrastructure costs, pollution, etc. it is easy to realize how potentially catastrophic it could be to add so much capacity to an already depressed market; however, all major players in the industry do not seem to realize that the drive to lower operating unit costs through larger and more efficient ships is creating a growingly dangerous imbalance between the available supply and the existing demand (AlixPartners: Container Shipping Outlook "Overcapacity Catches Industry in Undertow", 2016).

The theme of overcapacity has been a recurring issue that liner shipping companies have been facing for a long time, although most efforts for rationalization have not been effective. Indeed, trade imbalances are something embedded in the way the market is structured, with fixed schedules on the main routes, which often prevents supply and demand for vessel slots to be aligned. As Fusillo (2009) explains, however, this is the only possible way to make the service both efficient and reliable.

In addition to these problems, technological advancements have allowed shipbuilders to produce larger vessels that further widen the imbalance between demand and supply, especially in light of the slowdown of the Chinese economy. In parallel, technology has made the shipping infrastructures more efficient too, with more highly automated ports capable of handling cargo faster than ever before, reducing turn-around times and allowing more "travel time" to the vessels. To counteract this undesired efficiency, the practice of "slow-steaming", i.e. operating vessels at slow speed, has been widely adopted, also reducing bunker costs significantly.

According to Fusillo (2009), Haralambides (2004) and Kamalavacini (2016), the above mentioned issues translate into an unstable environment, where it is hard to enforce a "price discipline" able to automatically rationalize capacity and ensure profitability for carriers. In their analysis, they conclude that excess capacity could be controlled by means of operational

alliances that allow carriers to fully exploit the benefits of scale without having to drop the prices. However, when this is not possible due to different reasons, such as regulatory limitations, the industry will naturally tend towards further consolidation mostly through M&As.

Sjostrom (1989) applied the "theory of the core" to the shipping industry, explaining why perfect competition always leads to inefficient outcomes. It proposes that "industries with increasing returns to scale are always characterized by marginal costs lower than average costs"; the consequence is that, when competition intensifies, prices are progressively lowered until the marginal cost floor, which is too low to repay the average costs of shipping the goods. In such scenario, the only way a Pareto-efficient equilibrium can be restored is either through limitations on competition or through collusive behaviors.

5. Methodology

As already introduced in the introductory section of the work, mostly quantitative analysis has been used to answer the research question. The liner shipping industry's structure and characteristics have been reviewed in depth using different sources, from academic literature to more recent journals and publications regarding the latest developments of the market; the data concerning market shares, market capacity, companies' financials have been retrieved from Alphaliner's periodical reports, widely recognized as one of the most reliable sources for this kind of information for the industry. This data is important to understand what factors are responsible for the worst crisis that the industry has ever witnessed.

The purpose of this study is to develop a model that looks at the influence of consolidating events on the profitability of the liner shipping market. To do so, a sample of 154 monthly observations was selected, starting in March 2003 and ending in December 2015; thanks to the Central Limit theorem, the sample distribution can be considered normal. This time interval

was considered to be meaningful because it encompasses both peaks and down phases of the industry, thus making the model unbiased and stronger.

The dependent variable is considered to be the Shanghai Containerized Freight Index (SCFI), a comprehensive index that moves up and down based on the spot rates of the Shanghai container transport market, according to data compiled from 15 different shipping routes; in simple words, the rate indicates the indexed market price of shipping one 20-foot container, so higher prices translate into higher revenues for market operators. SCFI is therefore considered as the most important metric to investigate the health of global trade, and it is also used as the benchmark against which shipping companies trade derivatives to hedge against the high market volatility. Moreover, it seems reasonable to take freight rates as a proxy for profitability because we are considering a high fixed costs industry, so carriers ultimately have to maximize their revenues to deliver profits to shareholders.

A total of three independent variables were used in this model; the first one is represented by the monthly aggregate value of M&As effectively concluded in each month over the time interval of the study. The value considered is the value of the assets of the target company, lagged 3 months to allow enough time for the transition and integration of the merged entities to happen, after which it is considered effectively operative in the market. The source of information for the data is the Thompson One Database (SDC Platinum), and the search was refined according to the Standard Industrial Classification (SIC) codes that apply to the freight transportation maritime industry, i.e. 4412, 4424 and 4449.

The second and third independent variables included in the model are the count numbers of Joint Ventures and Strategic Alliances effectively concluded in each month over the time interval of the study. The count, rather than the size of the deal, was used because of the lack of financial data on these agreements, whose terms are rarely disclosed; data on Strategic Alliances was lagged 1 month to allow for them to be considered effective, while JVs were

lagged 3 months due to their more complex structure, at least contractually. Again, although there is no clear reason to believe that alliances will have a stronger consolidation effect than JVs, or vice versa, they were separated for a more thorough investigation.

In addition to this, two control variables were added to the model; the first one is China GDP Growth, which is considered relevant due to the central role of the country as the "engine" that has been fuelling global trade in the last two decades; in particular, it is included to check whether or not the slowdown of the Chinese economy has had an impact on the profitability of the shipping industry by means of a lower demand for transportation services. Data was retrieved from the World Bank database, and was broken down from annual to monthly assuming steady growth over the 12-month period.

The second control variable included is the total containership fleet, measured in million TEUs operating in the market on a monthly basis over the time interval considered; this is the most important measure of market capacity, and its distribution shows a steady increase over time, consistently with the introduction of mega-vessels already discussed in section 4. The data was extracted from the Clarkson Shipping Intelligence Network Database.

The data was further cleaned to get rid of events not entirely relevant for the analysis, such as alliances or mergers between companies with very limited geographical scope, or cases of vertical integration between carriers and port operators. These transactions are considered to have very limited impact on the study at best, specifically in the case of SAs and JVs, where counts, rather than volumes, are used; in this way, very small transactions between local players would have had the same weight of the alliances that have the potential to reshape the competitive dynamics of the market. Although this is a limitation to this study, it was considered as a reasonable trade-off, considering the alternative just mentioned above.

A confidence level of 90% has been chosen for this study, given the relatively small sample size. The linear regression was carried out using the Analysis tool in Microsoft Excel; although

more advanced softwares may have been used, the relative simplicity of the operation did not require more sophisticated alternatives to achieve accurate results.

6. Results

Before proceeding with the regression, a correlation test was performed on the independent variables to assess whether or not any excessive correlation existed between them. The output of the test is summarized in the correlation matrix in Table 6.1 (see appendix), with low correlation coefficients; however, since low correlations do not exclude the risk of multicollinearity, the Variance Inflation Factors (VIFs) for each variable have been calculated and are shown in Table 6.3 (see appendix). These results finally allow to exclude multicollinearity, as they are well below the common threshold value of 4.

The null hypothesis can now be stated; "the evolution of the freight rates in the shipping industry is not affected by the occurrence of M&As, Joint Ventures and Strategic Alliances, nor by China GDP growth and the size of the containership fleet available in the market".

The multiple linear regression output below shows satisfactory results in terms of the proportion of variance in the dependent variable that the model is able to explain; in fact, the adjusted R^2 is equal to 59%, while F is statistically significant, suggesting that the equation as a whole helps to understand the dependent variable.

Table 6.2 – Regression Statistics & ANOVA (5-variable model)

Regression Statistics	
Multiple R	0,7778
R Square	0,6050
Adjusted R Square	0,5917
Standard Error	95,0944
Observations	154

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	2050155,46	410031,09	45,34	0,00
Residual	148	1338356,74	9042,95		
Total	153	3388512,19			

The output above suggests that the null hypothesis should, therefore, be rejected, and that industry profitability is indeed influenced by at least one of the variables included in the model. To understand which variables are statistically significant, the single P-values must be assessed. Table 6.3 (see appendix) shows the t Stat and P-values of each of them, which helps to add more insights to the model.

To reinforce the thoroughness of the model, other regression tests were run to understand if different time lags for alliances, JVs and M&As delivered different results, or if the inclusion of past freight rates as a control variable changed the findings significantly, but the differences were minimal.

The first thing that is observed is that only the two control variables seem to be statistically significant for the confidence level chosen. Interestingly, none of the consolidating factors can be considered statistically different from 0, thus making their contribution in explaining the variation of the freight rates in this industry negligible.

Indeed, the same regression ran only with the two control variables explains almost exactly the same amount of variation, as it can be seen in the table 6.4 (see appendix); one possible explanation for what is observed might be that the consolidation efforts occurred over the time interval considered have not been sufficiently strong to counterbalance the concurrent developments of the Chinese economy and of the world containership fleet that have depressed the industry. In an interesting comparison with the airline industry, Brueckner (2001) found evidence of a positive effect of strategic alliances on market profitability, provided that the gap between supply and demand was not very wide. This last condition has very interesting implications for the shipping industry and may explain some of the findings of this thesis, such as a low statistical significance of alliances in explaining the variations in market profitability. Moreover, the developments of the regulatory environment post-2008 have placed alliances under strict control to ensure anti-competitive practices are not adopted, even limiting the

exchange of information within their members; the result has been a decrease in the ability of alliances to keep freight rates up for prolonged periods of time. Consequently, intra-alliance competition has intensified, causing instability in the market that has culminated in the current restructuring that is happening at the present time by means of a stronger M&A activity.

However, there is another consideration that has likely played a role in making the consolidation efforts ineffective in keeping the freight rates at profitable levels, and that is a principal-agent problem caused by the current system of incentives that are adopted by most shipping firms for their top managers. In fact, bonuses, stock options and other forms of variable pay are calculated on the basis of productivity metrics that aim at achieving high levels of vessels' utilization, but do not consider overall profitability in the equation. Although this system worked when overcapacity was not a recurring problem as it is now, it has not changed along with the developments of the industry; therefore, regardless of how many carriers dominate the market, there is always an incentive to compete in price wars to make sure that vessels ship with high utilization rates, even if this affects the overall profitability for the sake of personal gains.

Looking at the problem from this perspective, therefore, it is not easy to identify a reasonable solution to apply to this complex industry; to make the matter worse, containerships require very large capital investments and several years to be built and the delivery order book is heavily loaded (table 6.5), partly due to late deliveries of vessels ordered right after the last peak cycle of the industry that ended in 2008, and partly due to the widespread frenzy for economies of scale already discussed.

7. Limitations

This work project aimed at carrying out an extensive analysis about the competitive dynamics that have been reshaping the liner shipping industry in the last 15 to 20 years. As much as the research has been grounded on a quantitative basis, an objective limitation was represented by the scarce availability of data, due to the fact that a relevant number of the major operators are

not publicly listed. For this reason, the statistical analyses in this work have been performed on a relatively small data sample. As mentioned above, an important limitation was represented by the exclusion of a number of Strategic Alliances and JVs due to the utilization of the count, rather than the value, of these deals; unfortunately, the numerical values are not disclosed and hard to measure, and including all the deals of the original dataset would have misrepresented their impact on the competitive dynamics.

Furthermore, due to time and space constraints, it was not possible to analyze in depth the effects of the distinct regulatory frameworks on consolidation behaviors under different jurisdictions, although they are very likely to have a relevant impact on the competitive dynamics of the market, especially in Asia.

8. Conclusions

Despite the aforementioned limitations, some interesting conclusions can be drawn from this study. The key learning is that consolidating measures have been largely ineffective in fixing the profitability issues of the shipping industry, as they have not removed any excess capacity from the market, but rather changed the ownership of the vessels as a consequence of the takeovers. Divesting from fixed assets is not an immediate option either, since vessels are amortized over a lifespan of 25 to 30 years and demolitions come at a cost; therefore, in absence of a steep rise in demand for freight transportation services, the 3.5 million TEUs that will enter the market in the upcoming years will likely make the crisis more acute for shipping carriers. What can be expected, though, is that carriers will continue to adopt consolidating measures to concentrate market share and exercise more pricing power, especially in light of weak trade growth; as already mentioned, this industry has repeatedly shown that it cannot sustain perfect competition in the long run and the current developments of the market seem to go in this direction.

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